

WHAT IS CLAIMED IS:

1. A process for preparing cyclic and/or polymeric compounds comprising the step of subjecting a starting material to metathesis in the presence of a catalyst component comprising a member selected from the group consisting of homogeneous catalysts and heterogeneous catalysts, wherein the starting material comprises a member selected from the group consisting of compounds containing at least two functional groups in the form of a substituted or an unsubstituted alkene or alkyne units;
- wherein the catalyst component comprises a member selected from the group consisting of transition metal carbenes and transition metal compounds that form transition metal carbenes under the reaction conditions or transition metal salts in combination with an alkylating agent; and wherein the metathesis is carried out in the presence of ionic liquids.
2. The process of Claim 1, wherein the polymeric compounds comprise a member selected from the group consisting of homopolymers, copolymers and block copolymers.
3. The process of Claim 1, wherein the cyclic compounds comprise a member selected from the group consisting of carbocyclic compounds and heterocyclic compounds having ring sizes of ≥ 5 ring atoms.
4. The process of Claim 1, wherein the starting materials contain, apart from the functional groups participating in the metathesis reaction, at least one further substituent that is inert in the metathesis reaction and/or a heteroatom.
5. The process of Claim 4, wherein the substituents or heteroatoms mentioned are comprise a member selected from the group consisting of branched or unbranched alkyl radicals, aromatic or non-aromatic carbocyclic rings, carboxylic acids, esters, ethers, epoxides, silyl ethers,

thioethers, thioacetals, anhydrides, imines, silylenol ethers, ammonium salts, amides, nitriles, perfluoroalkyl groups, geminal dialkyl groups, alkynes, alkenes, halogens, alcohols, ketones, aldehydes, carbamates, carbonates, urethanes, sulphonates, sulphones, sulphonamides, nitro groups, organosilane units, metal centres and oxygen- containing heterocycles, nitrogen- containing heterocycles, sulphur- containing heterocycles, and phosphorus-containing heterocycles.

6. The process of Claim 5, wherein the starting materials used comprise α,ω -dienes that may contain a member selected from the group containing at least one further substituent that is inert in the metathesis reaction and a heteroatom,

wherein these substituents or heteroatoms comprise a member that is selected from the group consisting of branched alkyl radicals, unbranched alkyl radicals, aromatic carbocyclic rings, non-aromatic carbocyclic rings, carboxylic acids, esters, ethers, epoxides, silyl ethers, thioethers, thioacetals, anhydrides, imines, silylenol ethers, ammonium salts, amides, nitriles, perfluoroalkyl groups, geminal dialkyl groups, alkynes, alkenes, halogens, alcohols, ketones, aldehydes, carbamates, carbonates, urethanes, sulphonates, sulphones, sulphonamides, nitro groups, organosilane units, metal centres and oxygen-containing heterocycles, nitrogen- containing heterocycles, sulphur--containing heterocycles and phosphorus-containing heterocycles.

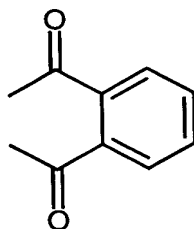
7. The process of Claim 6, wherein the α,ω -dienes used bear a substituent NRR^1 in the position to a double bond, wherein

R is an organic substituent,

R^1 is tert-butyl, $\text{P}(\text{R})_2$, $\text{P}(\text{R}^2)_2$, COR, SO_2PhR , COOR or CONRR^2 ,

R^2 is alkyl or phenyl,

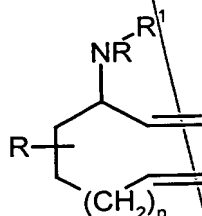
R and R¹ together form



and

said α,ω -dienes may also bear at least one further substituent R in any other position in the molecule with the exception of the α position.

- 5 8. The process of Claim 7, wherein R comprises a member selected from the group consisting of hydrogen, fused or unfused aryl, alkyl, CN, COOR² or halogen.
9. The process of Claim 7, wherein the α,ω -dienes used have the formula (I)

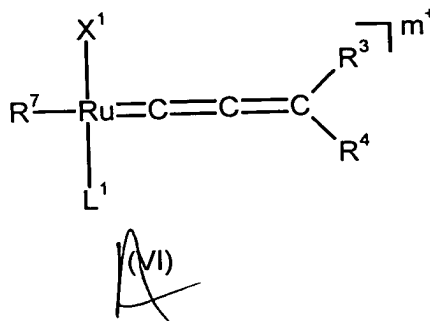
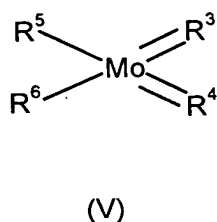
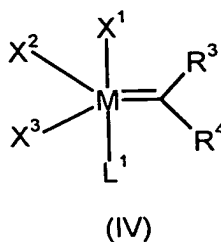
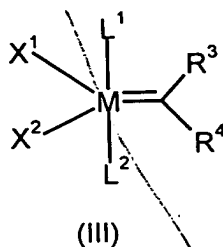


(I)

A

wherein R, R¹ and R² are as defined in claim 7 and n is 1, 2, 3 or 4, preferably 1 or 2, particularly preferably 1.

- 15 10. The process of Claim 9, wherein n is 1 or 2.
11. The process of Claim 10, wherein n is 1.
12. The process of Claim 7, wherein the α,ω -dienes used are diallylamine or 3-amino-1,7-octadiene, particularly preferably in their N-carboxymethyl-protected form, or 1,7-octadiene, 10-undecenoyl-allyl-
20 amide, 1,4-bis-oxypropen-2-yl-but-2-ine or buten-4-yl 10-undecenoate.
13. The process of Claim 1, wherein the catalysts used are compounds of the formulae (III) to (VI), wherein M is ruthenium or osmium



and

R^3 to R^7 are radicals are selected from the group consisting of hydrogen, C_1 - C_{20} -alkyl, C_3 - C_8 -cycloalkyl, C_2 - C_{20} -alkenyl, C_2 - C_{20} -alkynyl, C_6 - C_{18} -aryl, C_1 - C_{20} -carboxylate, C_1 - C_{20} -alkoxy, C_2 - C_{20} -alkenyloxy, C_2 - C_{20} -alkynyloxy, C_6 - C_{18} -aryloxy, C_2 - C_{20} -alkoxycarbonyl, C_1 - C_{20} -alkylthio, C_1 - C_{20} -alkylsulphonyl and C_1 - C_{20} -alkylsulphinyl, N-aryl; wherein in each case unsubstituted or substituted by C_1 - C_{12} -alkyl, perfluoroalkyl, halogen, C_1 - C_5 -alkoxy or C_6 - C_{18} -aryl; and wherein the radicals R^3 to R^7 may be linked to one another in cyclic compounds,

X^1 to X^3 are anionic ligands comprise a member that is selected from the group consisting of F^- , Cl^- , Br^- , CN^- , SCN^- , R^3O^- , $\text{R}^3\text{R}^4\text{N}^-$, $(\text{R}^3-\text{R}^7)\text{-allyl}^-$, $(\text{R}^3-\text{R}^7)\text{-cyclopentadienyl}^-$, wherein the radicals R^3 to R^7 are as defined above,

L^1 to L^3 are uncharged ligands comprise a member that is selected from the group consisting of CO , CO_2 , R^3NCO , $\text{R}^3\text{R}^4\text{C}=\text{CR}^5\text{R}^6$, $\text{R}^3\text{C}\equiv\text{CR}^4$, $\text{R}^3\text{R}^4\text{C}=\text{NR}^5$, $\text{R}^3\text{C}\equiv\text{N}$, R^3OR^4 , R^3SR^4 ,

$\text{NR}^3\text{R}^4\text{R}^5$, $\text{PR}^3\text{R}^4\text{R}^5$, $\text{AsR}^3\text{R}^4\text{R}^5$, $\text{SbR}^3\text{R}^4\text{R}^5$, wherein the radicals R^3 to R^5 are as defined above

and

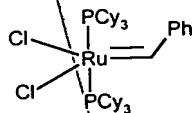
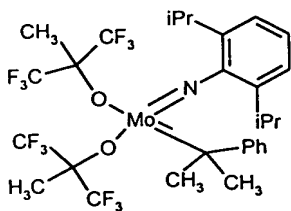
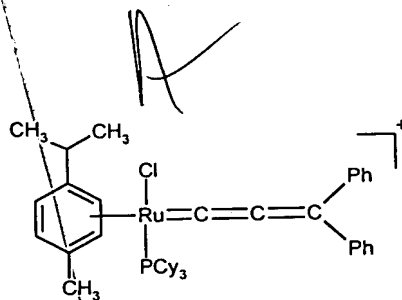
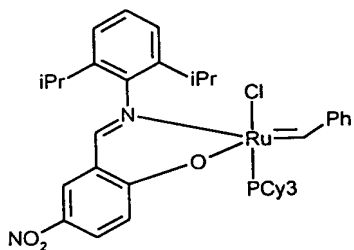
m is 1 or 2.

14. The process of Claim 13, wherein the catalysts or catalyst precursors used are compounds of the formula (III) and/or (IV) wherein L^1 and $\text{L}^2 = \text{PR}^3\text{R}^4\text{R}^5$, wherein R^3 to R^5 are as defined above.

15. The process of Claim 14, wherein R^3 to R^5 comprise a member selected from the group consisting of aryl or alkyl groups.

16. The process of Claim 15, wherein R^3 to R^5 comprise a member selected from the group consisting of secondary alkyl radicals and cycloalkyl radicals.

17. The process of Claim 14, wherein the catalysts used are the following compounds:



18. The process of Claim 1, wherein the ionic liquids used comprise a member selected from the group consisting of ammonium - hexafluorophosphate, ammonium tetrafluoroborate, ammonium tosylate, ammonium hydrogen sulphate and salt mixtures comprising aluminium

halides in combination with at least one quaternary ammonium halide and/or at least one quaternary phosphonium halide.

19. The process of Claim 13, wherein the ionic liquids used comprise a member selected from the group consisting of pyridinium
5 hexafluorophosphate, pyridinium tetrafluoroborate, pyridinium hydrogen sulphate, 1-methyl-3-butylimidazolium hexafluorophosphate or combinations of aluminium chloride with 1-methyl-3-butylimidazolium chloride, 1-methyl-3-ethylimidazolium chloride, N-butylpyridinium chloride and tetrabutylphosphonium halide.

10 20. The process of Claim 1, wherein the ionic liquids used comprise a member selected from the consisting of combinations of aluminium halide with mixtures of quaternary ammonium halides, quaternary phosphonium halides, and mixtures of ammonium hexafluorophosphate, ammonium tetrafluoroborate, ammonium tosylate and ammonium
15 hydrogen sulphate.

21. The process of Claim 1, wherein the reaction medium further comprises an additive that is selected from the group consisting of phosphorus compounds, amines, perfluorinated compounds, metal alkoxides and organic solvents.

Add
A₁ 7

add
C₁